DESIGN OF A CAMPUS INFORMATION SYSTEM FOR BAGHDAD UNIVERSITY

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DESIGN OF A CAMPUS INFORMATION SYSTEM FOR BAGHDAD UNIVERSITY

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ABSTRACT

DESIGN OF A CAMPUS INFORMATION SYSTEM FOR BAGHDAD UNIVERSITY

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Today, the development of technology plays an active role in all areas of life.
One of the most important benefits of this technology brought by the computer is the geographical information system (GIS), which helps in the provision of environmental data, with information consisting of data acquisition, creation, storage and classification, analysis and its comfortable use in all areas of life.
In life, especially in academic life in the era of information technology, GIS is the most effective use of this technology as well as being an extremely necessary tool for use on the campus, i.e. here on the University campus. It helps with computer-assisted study of contractions of the academic environment that can be implemented to enable more effective use of information because of the ready availability based on the map. The benefits of this information system are obvious. It helps in decision-making at a planning stage and also provides support to institutions.
A geographic information system on campus must be supported by a software support system.
In this study, a map-based information system is designed for the campus of Baghdad University along with the creation of an academic and administrative data

structure for the University as well as graphical data supported by computer enhancement of the social environment provided by the right program.
The information system has been designed based on the campus as a user of this information system and this information system is generated based on the map of the campus users, both academic and administrative staff, as well as the University students who want to get information about any person on the campus and its institution.

Keywords: Geographical Information System, Campus Information System, AutoCAD, ArcGIS, MapInfo.

ÖZ

BAĞDAT ÜNİVERSİTESİ KAMPÜSÜ İÇİN BİLGİ SİSTEMİ TASARIMI

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Bugün, teknolojinin gelişmesi, yaşamın tüm alanlarında aktif bir rol alır.
Bilgisayar tarafından getirilen bu teknolojinin en önemli faydalarından biri de GIS (Coğrafik Bilgi Sistemleri) dir ve GIS çevresel veri toplama, bilgi ve veri toplama, oluşturma, depolama ve sınıflandırma, analiz etme gibi hayatın tüm alanlarında konforlu bir kullanım imkanı sunar.

Hayatta, özellikle de akademik hayatta, bilgi teknolojisi çağında, GIS; bir üniversite kampüsünde etkin olarak kullanılabilecek çok önemli bir araçtır. Bu proje, haritadaki kullanıma hazır imkanlar sayesinde, bilgisayar destekli olarak akademik çevrenin kısıtlarının çalışılmasına ve bilginin etkin şekilde kullanımına imkan sağlar.

Bu bilgi sisteminin faydaları kaçınılmazdır. Bu planlama aşamasında karar almaya yardımcı olur ve kurumlara destek sağlar. Harita yerleşim bilgi sistemi, kampüste bir coğrafik bilgi sistemi ihtiyacı doğurur ve system bir yazılım destek sistemi ile desteklenmek zorundadır. Bu çalışmada, harita tabanlı bilgi sistemi Bağdat

Üniversitesi kampüsü için dizayn edilmiştir. Proje, üniversite için akademik ve idari yapıda veri oluşturmayı, sosyal çevrenin bilgisayar destekli grafik verilerle güçlendirilmesini ve doğru program temsilinin ortaya konulmasını amaçlamaktadır. Bu bilgi sistemi, kampüste hem akademik hem de idari kişilerin bilgileri kullanabilmesi için dizayn edilmiştir ve buna ilaveten öğrencilerin kampüsteki ve üniversitenin kurumlarındaki kişiler hakkında bilgi edinmelerini de sağlayacktır.

Anahtar Kelimeler: Coğrafi Bilgi Sistemi, Kampüs Bilg Sistemi, AutoCAD, ArcGIS, MapInfo.

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LIST OF ABBREVIATIONS

CAD	Computer-Aided Drawing
ESRI	Environmental Research Institute
GIS	Geographical Information Systems
WWW	World Wide Web
DBMS	Database Management System
DXF	Drowning Exchange Format
DWG	Data Working Group
DGN	Digital Graphic Novel
GPS	Global Positioning System

CHAPTER 1

INTRODUCTION

1.1. Background

The present age is the age of information due to the quick and sequential changes taking place in different fields, which leads to a huge quantity of information? The uses of this information include identity, data, and calculations of the natural and human resources on the surface of the earth, all of which require good-quality systems. Information systems and specifically geographic information systems (GISs) represent a significant field of computer applications that participate in supporting modern geographic studies, as most of the information used is directly connected to the location [1].

These systems help in finding a connection between location and urban service activities based upon the geographic approach principle as an integrated system to manage, analyze, store, and recover data along with the spatial dimension and data and landmarks such as roads, buildings, and infrastructure networks such as clean water, sanitation, and electricity and telephone lines as well as information about urban planning and relevant man-made [2]. Furthermore, analytical GIS has the advantage of showing the shifts or changes on the earth [3].

If computer technology actually provides positive results and applications thereof in many areas, it requires us to study the possibility of taking advantage of these technologies by investigating their usefulness to mankind and safety, and it is believed that they will be economically beneficial [4].

Baghdad University has passed the stages of urban multimedia development, including the study area, both in form and content. The change in urban area is the result of the acceleration in the development of business and complementary services, which produces a tangle of problems in serving the growing number of students and environmental and natural resources, which has had an obvious effect on the successive changes and amendments that have been incorporated in the overall structure of the urban planning at the university [5].

The use of information systems to assist in the renewal of information by comparing a set of maps and satellite visualizations. Over different periods of time as well as to determine the extent of the changes. That have occurred in this information, especially in the urban fabric and supplies. Therefore, there is urgent need to employ this technology, in order to fulfill the tasks, especially with regard to land use, urbanization and the characteristics of the study area [6].

Depending on the jobs, the GIS application can perform the following:

- Data entry and coding (digitization, data availability, futures).
- Data processing (data structures, geometric transformations, generalization, and classification).
- Reprocessing of the data (selection, spatial and statistical analysis).
- Display of data/information (graphical presentations usually).
- There is a need for integrated data management operations [7].

GIS is the general concept of the different thematic areas being developed to address these issues.

GIS applications can be listed as follows:

- Urban information systems.
- Forest information systems.
- Highway information systems.

- Logistics information systems.
- Security systems.
- Vehicle control systems.
- Traffic information systems.
- Earthquake information systems.
- Map information systems.

This GIS system is used initially on the campus in planning, development, and search functions and in education, as it can take action based on the use of the available information in order to make faster decisions, as well as helping in the evaluation of the available information to provide more services [8].

1.2. **Objectives**

This system has been designed for the campus and therefore the main objective of this study is to develop campus-based information system; based on the data on the map and the academic and administrative structure of the university, the structure that supports graphical programs in the computer environment is shown. This system is called the information system on campus, and is based on its users, who want to use campus maps, administrative and academic staff who have responsibilities in the reconstruction of the university, and the students present as well as associations that want to obtain information from the university. The system is designed identifying each user and his or her needs.

1.3. Organization of the Thesis

This thesis consists of five chapters, and these include all the necessary information about the thesis title of the GIS that provides all the programs that help to build an integrated information system for the University of Baghdad and to provide solutions to the problems of scientific research.

Chapter 1 is a general introduction to the thesis and outlines the aims of the study.

Chapter 2 is a general introduction to GIS and reviews its significance, sources and components as well as providing some general definitions from the viewpoint of scientists and researchers. This chapter deals with geographic information, the methods of classification systems, how to collect data, and the type of data that applications handle.

Chapter 3 is a review of GISs, particularly within the campus and their role in this field. It reviews the application of information systems and some examples of universities around the world and compares these to support the current study. Chapter 4 is about Tangier and is the backbone of the thesis because it represents the practical and applied side, reviewing the study area (Baghdad University), roads, and the building of the mechanism of integrated information systems for the university.

Chapter 5 presents the conclusions and future work.

CHAPTER 2

GEOGRAPHIC INFORMATION SYSTEM

2.1. The Concept of Geographic Information Systems

Geographic information is sometimes known as a system (spatial information system) or systems (land information) in which each set of processes begins with data collection, storage, interpretation, and analysis and then uses a procedure that allows addition, deletion or hiding of some of the components of the map or geographical contents and considers the spatial relationships of these phenomena on the basis of specific data geographically representing a feature that displays a similar GIS (dynamic maps). Therefore, it is necessary to use a lot of geographical, human, and natural resources and to deal with the best and most convincing information. These systems are employed to monitor these phenomena and plan for the management from a geographic perspective as well as to focus on understanding the spatial, including a large amount of information about rights. The difficulty of administering traditional methods in this environment has given this type of technology a prominent role in facilitating the monitoring of information and achieving this kind of accuracy, speed, and modernization, including applications in the field of urban planning, land use, and determination of the urbanization in the area of the current study.

There are different opinions about GIS and areas of application systems including:

1 Computer systems: These can identify and record information controlled by time and use the information and data relating to the sites, the content of these sites, and the sites of the publisher and data messages, along with specifications for these places, the qualities and characteristics of natural sites as well as human

urbanization, and information that results from natural characteristics of places and the inhabitants of these places [9].

2 A set of tools will collect, store, extract and convert the data to extrapolate and show where it is located on the ground [10].

3 GIS is a system of hardware, software, and procedures that aims to support the collection, management, processing and analysis of geographic data to show a number of schemes and complex administrative problems [11].

GIS is defined as a way of rating and ranking geographic quantitative and qualitative data stored on the computer and a means of information flow using the necessary equipment and specialized programs that are defined by (Carter) as "an integrated system for data storage and management of geographic information and analysis and also control the production of maps, and this data can be updated with the geographical nature and deal with them in order to take advantage of them" [12].

A GIS is used to represent geographic data and metadata that are collected or installed with a single system with the inclusion, saving, retrieving, and displaying of this data. The researcher finds that it is a system that depends on the availability of satellites, computers, software, and geographic data (maps, aerial photographs, satellite images, and spreadsheets), run by qualified staff; this system works on the collection, storage, updating, processing, analysis, and displaying of all forms of geographic information.

Through a review of some of the definitions of GIS we can say that it is a combination of several elements including a computer and its accessories and software that is equipped and able to deal with large amounts of geographic data that can be collected, stored, restored, updated, and linked to maps, thus producing digital maps is one of the basic function of GIS.

2.2. Data Sources in the GIS System

One of the most important roles of information in the field of planning is to ensure privacy, objectivity, rationality, and efficiency in order to reach the right decision. The data collection usually starts with the planning of information because this describes the situation and current conditions, and the collection of information

finishes whenever the results are good enough for planning purposes. GIS is compatible with many other sources of information.

Sources of information can be divided into the following [13].

2.2.1. Remote Sensing Sensor

This is the technical means of obtaining the object's properties without direct contact with it. The data are of great importance for the GIS due to continuous updating and the accuracy related to huge spaces and monitoring the source, which is done through monitoring satellites, aircraft, balloons, and other means 24 hours a day. The area's total control over 30,000 km with the French satellites having an accuracy of up to 10 m and the Russian ones an accuracy of 2 m. These multiple data formats include [14]:

A. Aerial Photographs

These are recorded on photographic film with high sensitivity; their accuracy could be improved, but they cover a relatively small area.

B. Digital Camera Pictures

Digital camera pictures are one of the modern methods that can be used at close range for the purposes of scientific research, comparison between satellite image cameras, and recording of the images captured in a digital format as in satellites, but this technique is still limited due to the high prices of these cameras.

C. GPS Data Destruction

This is a modern way to determine the exact location and elevation above sea level, and is linked to a sophisticated portable system on a large number of satellites that have been launched for this purpose. These means of specialist sensing maps can be obtained.

2.2.2. Specialized Maps

Specialized maps include for example topographic maps; they show land, cover plants, and residential areas of political and administrative boundaries. These maps are based on information obtained directly through the numbering system and then

the unification of predictions in one measure of the projection system. GIS offers great facilities in this system area that can be used with accuracy and ease to provide the possibility of switching between different measurements universally known as the system that can contain a lot of maps numbered for computer systems database and make full use of all the available tools [15].

2.2.3. Tabular Data

This is the summary resulting from the exploration group spreadsheets using a range of technical tools applied by specialized teams such as in topographical, statistical, and descriptive explorations. Such information is incorporated in the data, the staff of the system use the first stage which is linked to the second stage of the spatial advantages. Advantage is taken of data files from the, where information can be converted directly without the need to re-enter the new files. Maps are the main source of data for GISs; therefore, the significance of mapping lies in its information GIS.

GIS has a strong database system for the analysis of the information on the maps and outperforms many of the manual loading.

2.3. Geographical Information System Components

To understand the potential of this system, the general staff should acquire enough information about the characteristics of the components with which they operate, these components are as follows [16]:

2.3.1. The Physical Components: Hardware

The hardware supports many of the activities, starts from data storage for the CPU, which manages systems, synapses, and the alignment of supplementary. Automation as well as use information to convert the resulting data, which have been converted into digital programs. Data are collected in customized fields and mobile communication technologies (mobile), have become an important tool in data collection. Data update at the time of approaching real time as well as data in specialized international communication systems via the Internet (Web server) designed for this purpose.

2.3.2. Software

This includes a variety of important programs for the system's central geographic information. These programs are consists of GIS applications such as data that need to be created, edited, and analysed. GIS contains a large number of programs with the ability to add to and expand the capabilities of the system software, for example, the length and width of the arc view, which doubles the capacity for editing. The software program facilities comprise an independent program that performs certain functions, such as format conversion.

2.3.3. Data

This system depends mainly on the availability of data from different sources, and there are two basic types of data used in this system, which are as follows:

A.Geo Databases

These are the data relating to the retroactive rules and two sites on the special qualities of land (property data) that are often accompanied by raster metadata oriented with additional data that can complement spatial data.

B. Metadata Data Systems Documenting Geographic Data Sets

Other data that specialize in the field of storage and communication as well as alignment between the various systems, programs.

2.3.4. Personnel

Well-trained staff members are required to manage and operate this system of active ingredients, as it benefits from the feasibility of spatial analysis and good knowledge of deal offing with the media and specialized websites with high-capacity use of advanced software in these systems. There are three factors that can raise the quality level and makes the role of staff dedicated to the management complex and increases the efficiency of the operations in these systems.

- Education and academic specialization that are compatible with this system.

- Flexible ways of dealing with the system should be used alongside knowledge of the possibilities of the system and efficient and flexible utilization of available properties to get the best results.

- The ability to deal with sources of specialized information and data networks that can be accessed.

The level of education and the quality of specialization are the basic factors that affect the preparation of the teams that bear the responsibility for the operation and management of the system, followed by the role of expertise, which must be obtained through training and practice in the field of business entrusted to team and reflects the use of GIS applications. GIS also participates in the training session on the operation of the system and takes advantage of its properties, particularly with regard to full knowledge of the use of computer software and network connectivity with the sources of information and Internet websites in this area, the team which exploits the available techniques in the field of exchanging ideas and information support from local and international sources.

2.4. Technologies and Applications Contributing to the GIS

2.4.1. Global Positioning System (GPS)

GPS technology relies on an integrated satellite system and is dedicated to determining the location ID length, width, and height line as well as the universal time (UTC), which is a very necessary tool for an integration system (GIS) as it allows the collection of data location-wise every minute and concentrates on determining a point on the surface of the globe. Whatever the terrain and environment, GIS depends on the presence of a lot of interested people, uses many techniques to track the elected targets remotely, and also depend on search and rescue operations, automated programmers, the technical automatic identification of ships and air navigation via satellite, the guidance of research workers and travelers as well as archaeologists, and the exploration of hidden treasures, locating different types of sinking objects [17].

2.4.2. Internet

The latest achievements in technological advances are the use of Internet services with GISs with regard to spatial data, because there are a lot of interested professionals, researchers, and centers of specialized information around the world, where it those interested can exchange of ideas service and proposals, and this aspect is considered as the most important means of providing information. For example, old maps are vulnerable to loss, damage, and tampering, and therefore GISs can be used in reshaping and maintenance. Then these results are presented in a simplified picture for the decision-makers [18].

2.4.3. Base Map

The map includes geographical features (e.g. roads) that are used to represent the sites. A GPS, which is a possible new data collection method, is a system based on satellites for obtaining the coordinates of a point, which the user can then use accurately up to parts of a meter, with the possibility of assembling metadata or attributes directly, and storing them in tables, of these maps and later to a computer, and can be exported to most of the bodies in a GIS. Spatial data processing provides GIS software with several jobs for processing and analysis of spatial data, network analysis, and map projection [19].

2.5. Uses of GIS in Various Fields

The use of GISs in the researcher process and various checks are perform, and then these results appear in a simplified picture for the decision-maker. This process is done in many areas, including the following.

1. **Crisis Management**

   The possibility of analyzing road networks and infrastructure to determine the shortest paths between two points as well as the most appropriate paths between a groups of dots is available. GIS also serves to facilitate the process of maintaining new networks, which saves time and effort. Hence, the possession of maps and information is important for the management of disasters [20].

2. Emergency Medical Services

GIS is considered one of the best tools for emergency medical aid, providing data on the various types of accidents and demographic data about specific incidents, which can be displayed quickly and easily. It also helps to speed up the response of "emergency medical services" by identifying the aid unit nearest to the location of the incident, the shortest route, and alternative ways to get to the person or people, so one can see the speed and extent of the disease or epidemic infection before the actual prevalence, which helps with planning.

3. Urban Planning

GIS is useful for evaluating various services (education, health, security, etc.) in some deprived urban areas, in order to identify disadvantaged areas. The redistribution of services, is useful for comparing what is planned with the already existing reality, for a certain area, to contribute to building mathematical models of areas by identifying trends in urban growth, to reduce the spread, as well as to develop existing areas

4. Environmental Protection

The geographical classification helps in study of many of the environments of, in many directions, especially those of a physical, biological, chemical, and climatic nature, as well as keeping track of changes occurring in a certain area and estimating the different effects on the surrounding areas, by comparing a group of photographs and maps taken on different dates.

5. Economic and Social Studies

GISs contribute to the study and analysis of the economic and social characteristics of a particular area, based on specific criteria identified by experts, the conclusion drawn from development indicators, which contributes to making appropriate decisions regarding all development trends

6. Production of Maps of Land use and Natural Resources

Modern GIS techniques are used to produce maps showing areas of natural resources ion a certain area (water, minerals, petroleum), which describe the current use of the land, and the future use of map.

7. Conclusion Derived from the Earth's Surface

It is important that GIS forms an accurate visualization of the earth's surface with which it is possible to work. This is done through the introduction of contour maps of the area. The use of GIS technology can be used drilling and filling quantities in a specific area or identification of forms of currents rents, trends, and tendencies in any area.

8. Improvement of Productivity

One of the most important benefits of technology is that it can improve the overall structure and operations of various types of resource management. GIS has the ability to communicate with each data set related with some geographical locations, making it easier to share the data and to facilitate communication between different departments. When the data are uniform one can take advantage of the work to build a base and the data are collected only once and used several times, productivity is improved, thereby increasing the overall efficiency.

9. Taking Appropriate Decisions

It is commonly known that "better data lead to better decisions" especially in GIS. This is not a mechanism for decision-making, but a tool for query and analysis, and thus contributes to the development of clear, complete, and accurate information for the decision-maker. GIS also contributes to the selection of the most appropriate places on the basis of the selection criteria for the user, such as the distance from the main road to a specific location, price per square meter, being away from contaminated areas, and so on, this gives freedom of choice to the final decision-maker.

10. Building Maps

Maps have a special status in GIS, because the drawing of maps uses the GIS process, which is more flexible than any manual method, as this process begins with building databases and then digitizing available paper maps. The maps are then also updated by using satellite images, in the case of existing ones, and then linking the data to begin the process of geographical positioning of maps. Then the final products of the maps are ready to be displayed, and information-specific symbols are selected and used to clarify the map in order to illustrate specific characteristics such as showing affected areas which are distributed on the map using the concept of the specific code**.**

2.6. Steps to Build a GIS

Rules intended to build geographical database include the simulation of reality by building a model of the existing components of this nature in addition to the bilateral relations linking these ingredients, giving each component of these elements distinguishing characteristics by nature so that the map mimics reality with all its specificity, thereby maximizing the benefit of GIS. The process of creating an information system has several stages, which can be summarized in the following points [21]:

1. Data Collection

GIS uses existing information from maps, satellite images, weather, photographs, and statistical data, provided that there is a common spatial relationship between these data; it uses the GIS focus, and finds relationships between different data items that are found on the map. The data collection is determined, however, by the time limiting factor within the GIS as well as the relations between the different variables to determine the required data.

2. Data Input

Before geographic data can be used in a GIS, these data must be converted into a suitable digital format. The conversion process is called “digitizing”. The GIS can do the job completely automatically for large projects, using scanning technology, while

small businesses require manual conversion. Today, most of the types of data can be obtained from the function of data collection and from digital conversions, and then files are downloaded directly to the GIS**.**

3. Processing Manipulation

It is natural that once allocated to the GIS, specific types of data need to be turned on or adjusted in some way to make them suitable for the system. Information available on different geographical scales must be converted to a certain level of detail and accuracy, and the conversion is temporarily displayed. This is achieved always by a Special Analysis. Moreover, GIS technology provides several tools to assist in adjusting the data needed and to get rid of unnecessary data systems.

4. Data Integration

Integration of information for GIS purposes is difficult to achieve in simple ways. The GIS can be used for combinations of different maps to build or analyse different variables. By using GIS and information technology, for example in a water company, it is possible to exchange the water in an information system simulation and thus to determine the amount of water that can be used in every field in every area. Therefore, the initiation of high water-rate areas can be determined by GIS as well.

5. Standardization and Projections

Among the most important properties of any map is map projection. It is necessary to determine how a part of the earth's surface can be overlaid on a geometrical shape or a flat sheet. A directive is a mathematical way to transfer information from the 3D land to a 2D environment either on paper or on the computer screen, and various projections are used for many different maps, because every projection is appropriate for a specific use. As an example, a projection that maintains the shape could give the wrong areas, and a projection that is accurate can be relied upon may give unreal forms of landmarks on the surface of the earth. Like most of the data in a GIS, which come from existing maps, this system uses a computer to determine the strength of digital data collected from different sources from different projections to drop the uniformity. By linking information from different sources, if possible, for example

by connecting the information about rainfall in an area with aerial photographs of the area with some of the tabular data, soil data, and geological trends and tendencies, it is possible to identify whether any of the land is wet or dry at a certain time of year, and the GIS, which can use the information from various unparalleled sources can help in conducting this analysis. Initial requirements for the data source are limited to different places, these data which can be used to locate the place on three axes (X, Y, Z) to reflect the latitude, longitude, and altitude or other systems. Any variable element can be located and can benefit from GIS and many computers with the raw data, which can be covered by GISs, produced by private institutions as well as various types of data maps can be covered by the GIS.

6. Data Collection Sources

Information from different sources can be like, if possible, for example by linking information about rainfall in the region taken from aerial photographs of the area. Some of the data are taken from tables of soil data and geological trends and tendencies, it is possible to identify the types of data proposed for a region. Different types of maps, data, and satellite imagery can be used as the main data sources. Then digital data can be produced by using commercially available GIS software. GPS is also one of the important data collection sources used in creating geographic databases.

7. Data Modelling

Modelling refers to building a working simulation of reality, by building a model, we can understand the specific position or predict future outcomes resulting from an activity. This model is a set of steps and rules, including the rules of spatial GISs. As an example, we find that it is difficult to link land maps with rainwater quantities in certain places such as airports, television stations, and schools. A GIS can be used to determine the characteristics in 2D or 3D of the manifestations of the surface, beneath the surface and rain in specific area .

8. Data Management

For small GIS projects, it could be sufficient to store geographic information in ordinary files, but when the volume of data becomes large, a large number of users

use the preferred database management programs to help store, organize, and manage the data.

A database management system (DBMS) is a competent process for storing, organizing, and managing all data types, including spatial data used in GISs; therefore, any GIS's dependence on a DBMS is dependent on essential terms of integration between the data ranked in the tables and that deal with DBMS strongly, and are represented on maps and satellite imagery that are unique to GIS management or deal with geographic data.

9. Enquiry and analysis

When a GIS contains geographic information, it can begin to ask the system questions. There are some simple questions such as:

1. Who owns a specific piece of land?
2. What is the distance between two places?
3. What is allocated to industrial use areas?
4. What are the locations for building the houses?

2.7. The use of GISs in Network Analysis

Networking is the process of analyzing a network and is the most important function that a GIS can carry out efficiently. Because the movement of people and the distribution of goods, services, and energy are done through road networks and infrastructure, the shape and the efficiency of these networks largely determine the standard of living of individuals and significantly affect the fairness of the distribution of services.

GIS provides different analysis methods for the study of any ground feature and express them in a digital image. After that, the process of dealing with that network begins with a set of spatial commands, which calculate the desired tracks and project the outcome to the user the user in the form of the options.

Examples of the application of network analysis include the following.

1. Finding the Best Path

This is one of the most important problems that the network analysis system deals with. Solutions obtained from GIS determine the path that achieves least values (cost).

2. Allocation

Allocation aims to determine which parts of the network can represent a point or set of points in a certain area and divides the network into sub-parts. The part of an area from a certain point, is called the target, and thus the final result is shown on a map of the area, which makes it easier to make decisions about building new units in processed area or the relocation of some points to ensure an equitable distribution of the service.

4. Tracing

One of the vital tasks when a study or analysis of the networks is conducted is to know about interconnected network parts at a certain point, for example a breakage in water pipes in a certain area, a malfunction in one of the power transformers, or the amount of water gathered from river branches at a certain point.

CHAPTER 3

CAMPUS INFORMATION SYSTEM

3.1. Campus Information System

Today, with the advances in information technology achieved in all areas of our lives, information is stored, and storage and efficient use of information for systems are encountered. The storage of information through information systems and updating arrangements is more effective. The result of this makes it possible to develop opportunities in all areas [22].

Information technologies are constantly emerging technologies. This development is hard to imagine. The best thing to do in the process of development is to locate and make it active, that is, through innovations in information technology.

The main problem experienced in institutions is when information is needed and one is not able to obtain it without having a regular structure of archival information. Thus the new information has to be produced correctly and quickly when needed. From the point of view of the development of a society, one must not overlook the important means of utilization of information systems, which has one of the most important places in training institutions. Universities are defined as scientific place and public entities with a high level of education, training, research and broadcasting faculties, institutes, colleges and educational institutions and similar organizations of units [23].

An information system on a university campus helps to increase the effectiveness of education and training in order to increase the success of the university and the academic subunits (faculties, departments, and so on). It consists of the collection of related spatial and non-spatial data, transfer of the data to a computer, storing, querying, analysis, and graphs and reports to users. In general, a university

incorporates three different structures:

People (students, administrative staff, assistant staff..., etc.)

- Finance (the system resources required for processing)
- Function (the university's management approach)

University campuses are generally residential units consisting of many buildings. A dense population lives on campus continuously. The primary task of universities' education and research is to create management and planning with limited resources, which is a difficult task.

GIS is an important decision-supporting tool for spatial data with a combination of verbal data analysis, providing fast and accurate decision-making for management. Physical planning and proper use of tools, materials, and resources can help to provide the benefit of significant improvements in the use of a GIS if provided [24].

GIS is a technological tool for understanding geography and for making smart decisions through spatial visualization and analysis. GIS can, for example, help manage infrastructures both outside and inside buildings, providing a comprehensive way to optimize space and personnel movement, map classrooms efficiently and ensure compliance with the specific rules and policies. GIS can be used to explore educational institutions at all levels of a geographic system: a campus, a building, or even a particular asset. As an integrating technology, GIS works in collaboration with other technologies [25].

We can do the following:

- Create data and attribute data to the main campus walkways.
- Complete and verify the data about the road features of the campus.
- Complete data campus parking features and verification.
- Obtain digital domain campus and GPS verification.
- User can almost see the field to check the water and digital university campus features overlapping data type.

- User can see the digital campus almost drainage features for field verification of data type overlap.
- Campus includes a digital electrical data can know almost overlap.
- Can also see the overlap campus sewage Type.
- Campus injection wells, mapping, GPS, and field verification.

3.2. Benefits of the University Campus Information Systems

The biggest benefits of using campus information systems are that they provide safety for the university and education about saving the university's human resources as well as better utilization of physical resources, better planning, which means cost-effective.

Using the new technology is a blessing and as technology evolves it needs to be used. Traditional methods are needed to map different units of the same map of the area. Various standard development operations form a standard base for the maps. This situation makes the data inconsistent and also raises doubts about the accuracy of the data, which also increases the cost and increases repetitions of the data collection process. With easily accessible, high-quality information, analyses can be carried out faster and better, and accordingly the right decisions can be taken. Better cost/benefit analyses and better quality documentation and monitoring of progress can be achieved. In physical planning, decisions will dramatically change many applications. For example, such an information system can be used for a newly constructed building.

The information is documented on paper, stored electronically for making information more efficient and accessible. This will make it easier to transport and distribute data. Updating of information will be easier. Floor plans and so on, however, use a paper medium. Document use and updating will be easier with further different schemes, such as a common coordinate system, they make the construction of new buildings to be occupied easy, and an analysis can also be conducted. All the benefits listed above make the administration of university life easier, make jobs of the staff easier, and increase the speed of decision-making.

3.3. Creation of a Campus Information Service

Today, university information systems are used by many different universities for different purposes and in particular they make university campuses more effective, particularly in terms of utility structure. In creating this structure, GISs (graphical and non-graphical data with tables and maps) will be used as they provide the advantage of different databases in the structure. However, the system of the components that one needs must be remembered and considered. These are the basic components of the GIS without which consideration of a system should be avoided. These components, as mentioned before, include data and databases, software, hardware, people, and methods (see Figure 1) [25].

Figure 1 GIS Supports Campuses

3.4. Campus information System Applications

There are many information system applications for university campuses across the world. Campus information systems across the world can be found in these various applications. The Internet environment that can be accessed from a university's information systems is usually in different ways. One of them is in the form of campus maps.

Youngstown University

As shown in Figure 2, a structure is marked on the interactive map. The buildings in the diagram contain information on sections, chapters, staff, and other things. So by following steps, departmental Web pages can be reached. The building's opening and closing hours seem to be obvious as well [26].

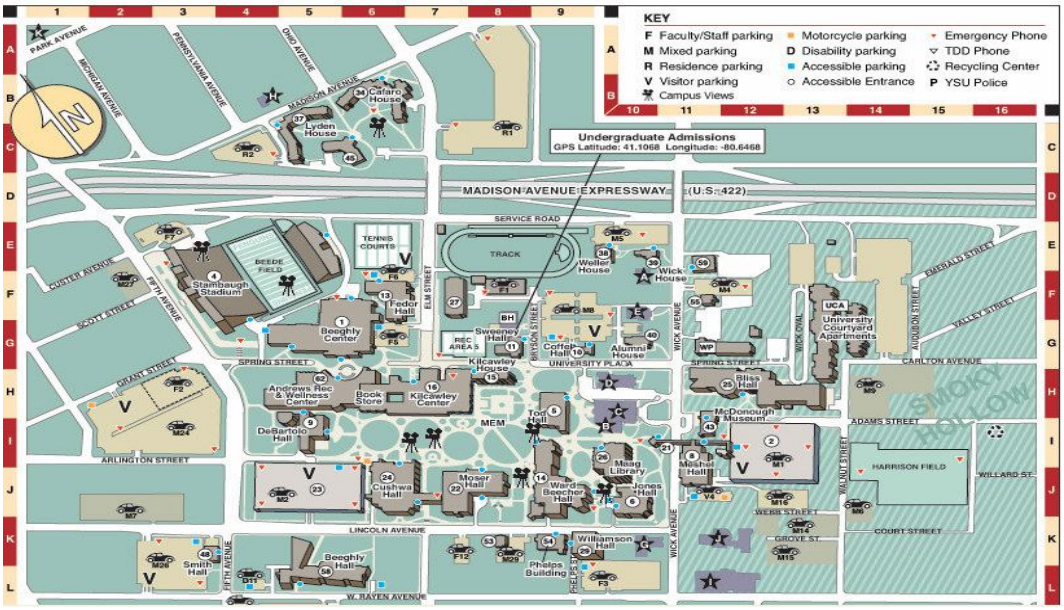


Figure 2 Youngstown University Campus Information System

Sonoma State University

This has the names of the buildings written on the left side of the page and on the right there is a map of the campus. By selecting a building on the right side of the photograph, information on any selected building is given. Also, some parts of buildings are mentioned, as shown in Figure 3 [27].

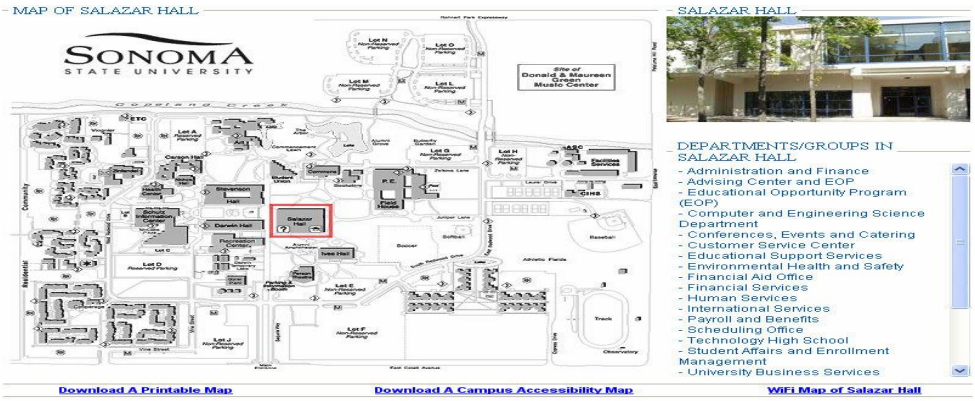


Figure 3 Sonoma State University Campus Information System

Abilene Christian University

There is two maps. One of them the university campus, and other the plan is located on the campus map. This is an interactive map. Both map representations of the buildings with the lists of the buildings as well as the information shown in Figure 4 can easily be acquired. The information given includes the history of the building, with specific hours of work, addresses, and photographs, based on information about the unit given as shown in Figure 4 [28].

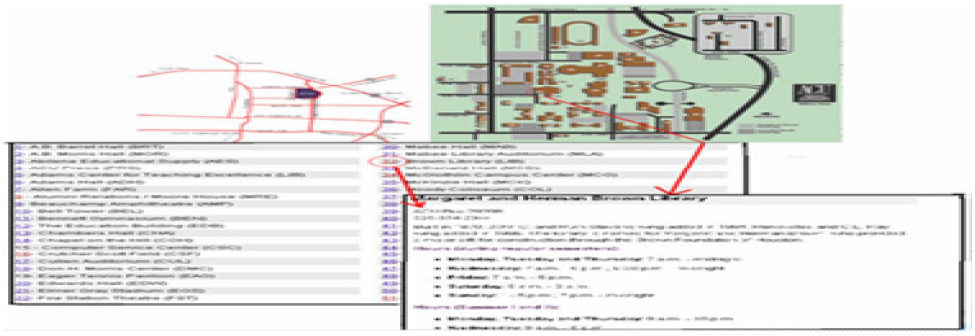


Figure 4 Abilene Christian University Campus Information System

Texas A & M University

Both a map and a satellite photograph of the university are shown in Figure 5. The name of the building is on the left side of the page. This building is divided into categories of names. Here the selected building on the right is marked on the map and number. Most of the buildings on the right have taken coordinates in the order in which the names are marked [29].

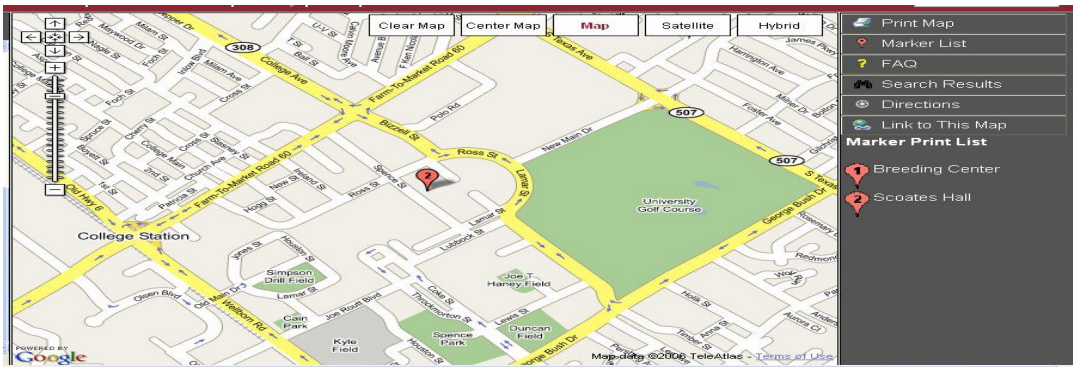


Figure 5 Texas A & M University Campus Information System

Western Michigan University

On the map, the building can be approached a certain distance. There are different titles under parking lots, bus routes, and so on, and satellite photographs inside the buildings provide the opportunity to see the addresses of the units as shown in Figure 6 [30].

Figure 6 Western Michigan University campus information system

Osaka University

Maps of the campus of the university are organized separately. On this map, pictures of buildings are shown. Lists of the names of the buildings are shown in 3D label on top of the building, which belongs to each section and for the educational information that is given. In addition, under the title "Campus Walk", on-campus photographs of buildings and brief information about the buildings can be obtained. It is also possible to see the proximity to the campus in each case, along with alternative means of transportation, and all this is shown in Figure 7 [31].

Figure 7 Osaka University campus information system

Academy of Art University

On the map of San Francisco, the university's buildings, streets and area of interest can be displayed, but they cannot be selected on the map. There are three main headings on the left side in building addresses, containing sections and accommodation facilities are located under the building or street names. Selected locations on the map are identified along with photographs of the building and to the right at the street address, as shown in Figure 8 [32].

Figure 8 Academy of Art University Campus Information System

Berkeley University

There are both fixed and interactive maps. Both kinds of enquiries are possible. By choosing the right building on the interactive map, one can retrieve its photo taken from both sides as well as attribute information about the building. Other query abilities can be found in the list on the bottom right corner of the screen. For the selected building on the interactive map or the others listed in the table, it is possible to retrieve attribute information and photographs as shown in Figure 9 [33].

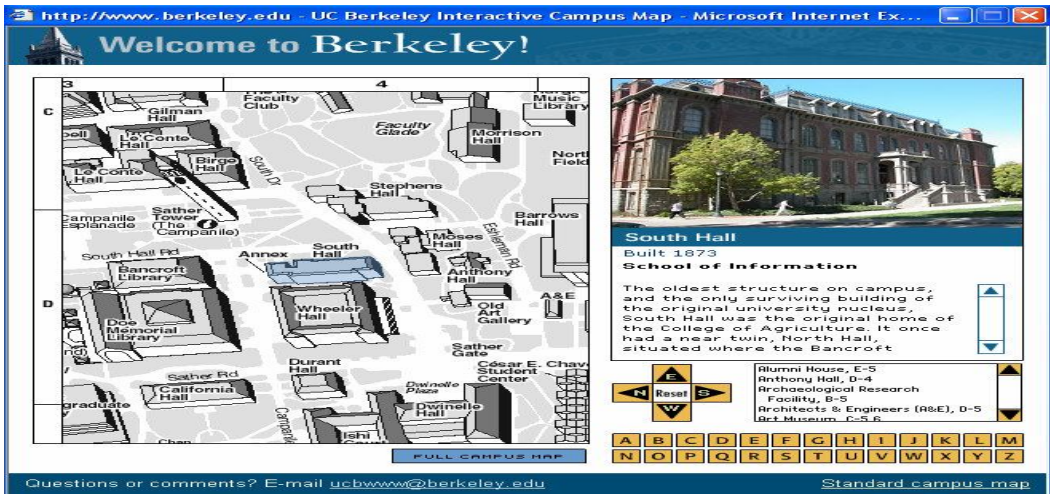


Figure 9 Berkeley University campus information system

Boston University

When the mouse is moved, the interactive map or road building changes color and name. In addition, areas with a yellow frame can be seen in detail on a smaller map. The list provides the opportunity to find the desired building. To reach the relevant information about the building "on the Web", the article also gives a link. The introduction of a separate building location is shown on the map in Figure 10 [34].

Figure 10 Boston University campus information system

George Washington University

An interactive map of the campus as well as a 2D and 3D representation has been created. This facility gives the opportunity to display the more detailed 3D version of the entire campus. Then the campus buildings and 3D view can be processed in detail. The left side of the page gives the user the chance to query boxes. It is possible to perform a scan by entering the name of the building. Also buildings are categorized, which makes it possible to see them on the map. It is possible to find out

the street names in or near areas of the campus. In addition, 360º photographs of some of the places on the campus are provided, as shown in Figure 11 [35].

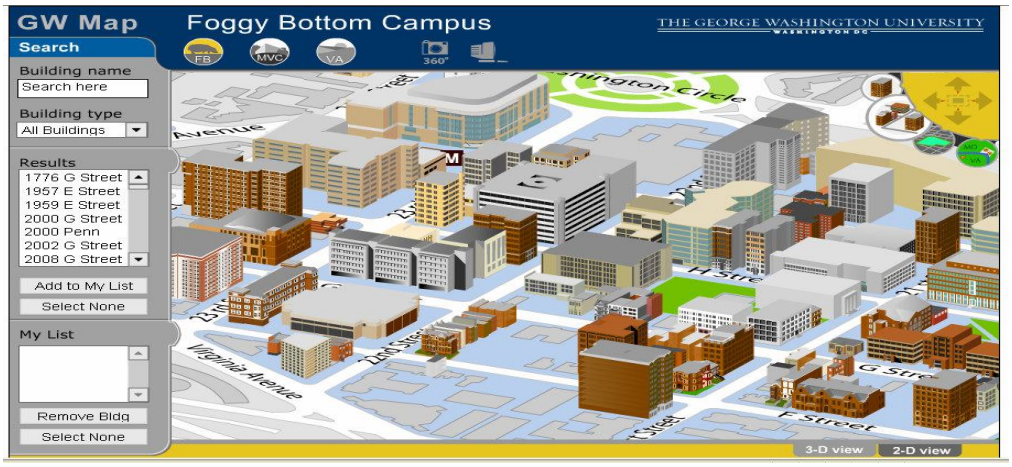


Figure 11 George Washington University Campus Information System

Yale University

This university map's usage is a little confusing. There are both interactive and normal maps. The map of the area, which changes from a normal map to an interactive campus map, can easily be accessed. Grouping has been applied to the interactive map. The campus area is divided into five groups and each property is given a name. Building entrance doors and elevator locations are shown on the map. By clicking on buildings, textual information about them is given. Also based on a separate page from the building name, a building's location on the map and verbal information can be accessed as shown in Figure 12 [36].

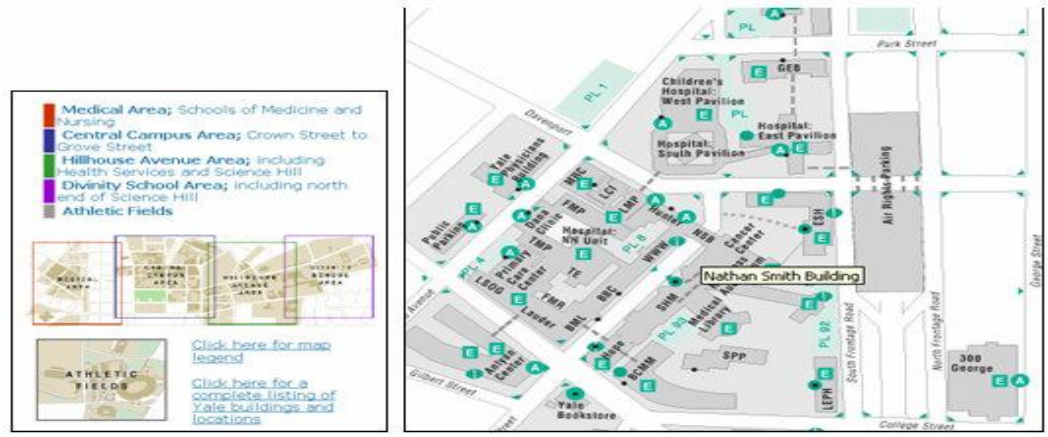


Figure 12 Yale University Campus Information System

University of Tsukuba

Here each section of the interactive map is located on the map and the entire campus is divided into four. The section is selected from the list of names found on buildings; buildings shown on the map seem to change color and name. Also, on the left side, buildings are photographed as shown in Figure 13 [37].

Figure 13 University of Tsukuba Campus Information System

Tokyo University

There is more than one campus and separate links are given to each campus plan. Any connecting inside a building in the form of a list of names found. On selecting one of the building names, the building on the campus map shows the location of the image in a different color, which is easily determined. Furthermore, for each proximity to the campus, alternative transportation conditions are shown as displayed in Figure 14 [38].

Figure 14 Tokyo University Campus Information System

University of Oxford

Groups of different buildings are formed on the interactive campus map. By referring to the numbers on maps, the building names can be seen, and by selecting the selected Web page of that building can be reached, as shown in Figure 15 [39].

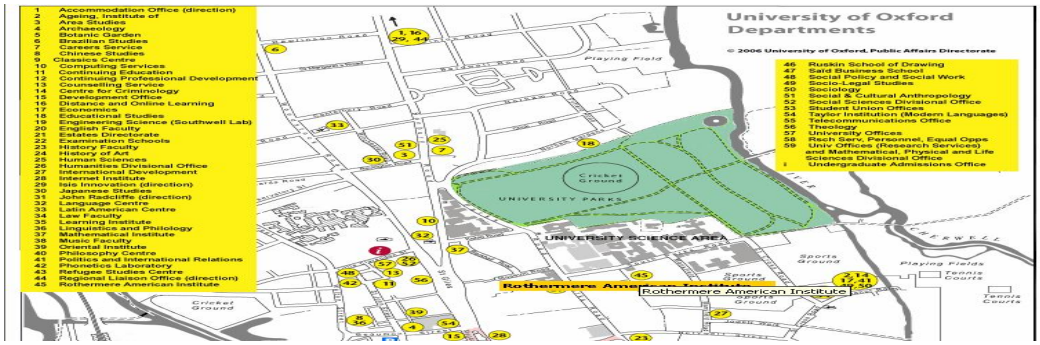


Figure 15 University of Oxford Campus Information System

Cambridge University

This is an interactive map of the campus. First the name, address, and telephone number of the building are selected on the building map, and from there the corresponding Web page can be reached. Only the information on the buildings numbered on the map can be obtained from the page. From the map, the user can go back to the window. The map has the ability to be zoomed in and out. A campus map of the city's streets and important buildings, along with supporting information, is shown. Information on transportation to the campus is provided on routes, as shown in Figure 16 [40].

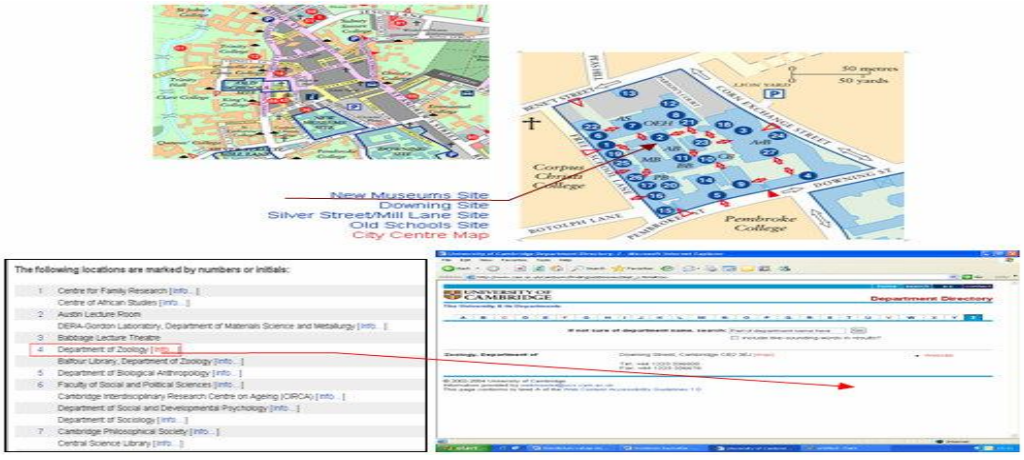


Figure 16 Cambridge University Campus Information System

University of Edinburgh

There are five separate structures on this map of the campus. Four of these are interactive maps. Listed on the left side of the map are the types of buildings and parking areas. They are marked on the map in any places where only their icons can be found. Multiple features can be displayed simultaneously. Also, starting from the bottom of the page, the names of buildings are shown on the map. By selecting names on the map, buildings and communication addresses can be accessed, as shown in Figure 17 [41].

Figure 17 University of Edinburgh Campus Information System

Munich University of Technology

The city plan gives the opportunity to the campus plan. Google Earth provides the opportunity to find the building. The map of the buildings only has names on a visual map. Eight different types of maps are presented. This map has the ability to locate one of the rooms. A person can investigate just by entering the name or room number on the map and identifying the location of the room. Also, any student or anyone at the university or from outside can use this map, which is available 24 hours a day. Separate maps (including bus routes, sports fields, etc.) are shown in Figure 18 [42].

Figure 18 Munich University of Technology Campus Information System

Utrecht University

There is an interactive map on the University's website. This map of Utrecht shows a plan of the city, which is very close to the campus. The campus map enables a certain proximity. The building names on the map can be seen by selecting the building, name, house information, and so on. The addresses and photographs are displayed in the window on the right side of the map. Building entrance and exit locations and bus routes are shown on the map. Also, the Web pages related to the building, provide access as shown in Figure 19 [43].

Figure 19 Utrecht University Campus Information System

California State University, Bakersfield

The campus plan was divided into four slices with a number assigned to each building, and from the menu the user can choose any building. A photograph of the building can also be found. When the user clicks on the building, the name appears

on the building. For emergencies, telephone points and parking areas are indicated. On the map, the campus transportation path is as shown in Figure 20 [44].

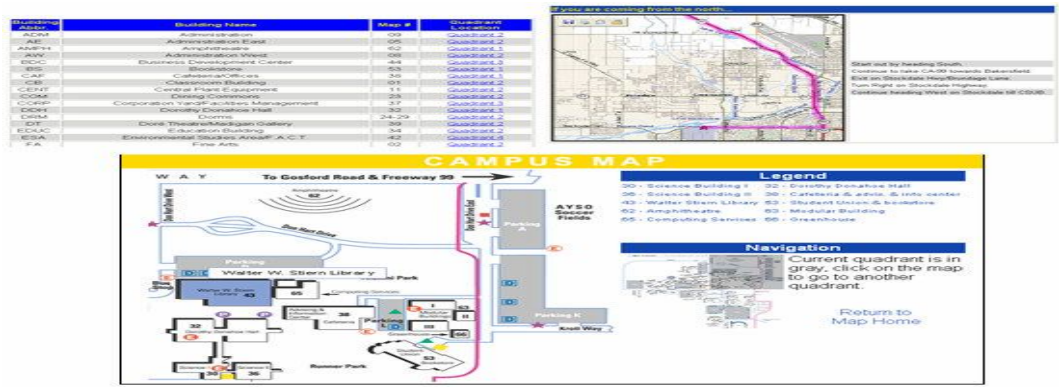


Figure 20 California State University Campus Information System

California State University, Chico

On the campus map, the directions are divided into eight sections. If the user marks one part only, that portion of the map is shown. On this map, by selecting a building within a building layer, all the units can be reached. Any building can be selected that can be found on the Web page associated with the respective program information and the announcements can be found as shown in Figure 21 [45].

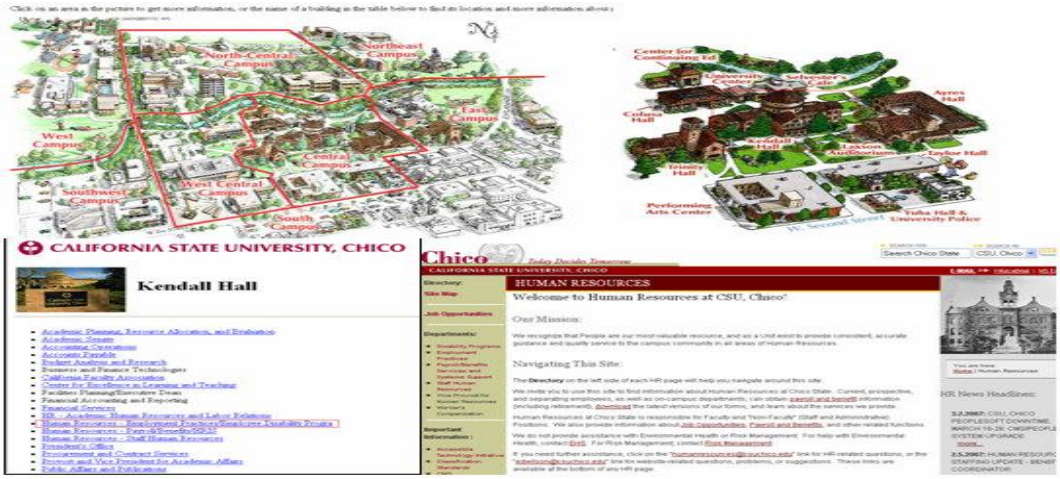


Figure 21 California State University Campus Information System

Andale University

Buildings connected to the university, located in different parts of the campus, can be displayed on the map. In each application, numerical or verbal queries are possible. The name of the building is marked on the map on the right side of the photographs. From the list on the upper side of the building, any desired location can be selected.

On the map of the campus, the city location can be easily seen, as shown in Figure 22 [46].

Figure 22 Andale University Campus Information System

Bogaziçi (Bosphorus) University

Here the campus maps have been prepared separately. A campus map (master plan) can be seen on the map of Istanbul. By selecting any of the campus buildings, information about the history of the building can be found, as shown in Figure 23 [47].

Figure 23 Bogaziçi University campus information system

3.5. Comparison of the university campus information systems

All university campus information systems above were reviewed by taking the properties, that is, the presence of an integrative map, addresses, maps, building information, communication address, and building photographs, and preparing a comparison rubric Table 1.

Table 1 General Features Investigated0: Non-existent 1: Existent

University Name	Integrative map	Address	Map	Building information	Communication address	Building photograph
Youngstown University	**1**	**1**	**0**	**1**	**0**	**1**
Sonoma State University	**1**	**0**	**0**	**1**	**0**	**1**
Abilene Christian University	**1**	**1**	**1**	**1**	**1**	**1**
Texas A & M University	**0**	**0**	**1**	**0**	**0**	**0**
Western Michigan University	**1**	**1**	**0**	**1**	**0**	**0**
Osaka University	**1**	**0**	**1**	**1**	**0**	**1**
Academy Of Art University	**0**	**1**	**1**	**0**	**1**	**1**
Berkeley University	**1**	**0**	**1**	**1**	**0**	**1**
Boston University	**1**	**0**	**0**	**0**	**0**	**0**
George Washington University	**1**	**0**	**0**	**0**	**0**	**1**
Yale University	**1**	**0**	**1**	**0**	**0**	**0**
University of Oxford	**1**	**0**	**0**	**0**	**0**	**0**
University of Tsukuba	**1**	**0**	**0**	**1**	**1**	**1**
Tokyo University	**0**	**0**	**1**	**0**	**0**	**0**
University of Oxford	**1**	**0**	**0**	**0**	**0**	**0**
Cambridge University	**1**	**1**	**0**	**0**	**1**	**1**
University of Edinburgh	**1**	**1**	**1**	**0**	**1**	**0**
Munich University of Technology	**1**	**1**	**1**	**0**	**1**	**0**
Utrecht University	**1**	**1**	**1**	**1**	**1**	**1**
California State University, Bakersfield	**1**	**0**	**1**	**0**	**0**	**0**
California State University,	**1**	**0**	**1**	**0**	**1**	**1**

Chico						
Andale University	**1**	**0**	**0**	**0**	**0**	**1**
Bogazici University	**1**	**0**	**0**	**1**	**0**	**1**

CHAPTER 4

METHODOLOGY

4.1. Baghdad University (search area)

Baghdad University is proud of its long history. It is not only the largest educational institution but also one of the most memorable resources of many staff who have made extensive effort in the fields of technology and administration in education. It has made progress in transferring its wealth of experience to other Iraqi universities, which were developed at a later date. The formation of a university in Baghdad was due to the recognition by the government's First Committee of the need to establish a university in Iraq in 1943 [48], which led to the creation of the University of Baghdad. The new campus was built by the Royal Government of Iraq in the late 1950s, and was located near the Tigris River. The buildings were designed by the cooperative engineers Walter Gropius and Lewis and Robert MacMillan, who in the 1950s began their master plan for the new campus for the faculties of Engineering, Science, and Arts for a total of 6,800 students. The campus was expanded in 1982 to accommodate 20,000 students as well as support facilities for them. Hisham N. Ashore and Robert Owen developed the full academic spatial program for the entire campus. Baghdad University has suffered greatly as a result of the occupation of Iraq, with up to 90% of the students dropping out of some classes, as shown in Figure 24.

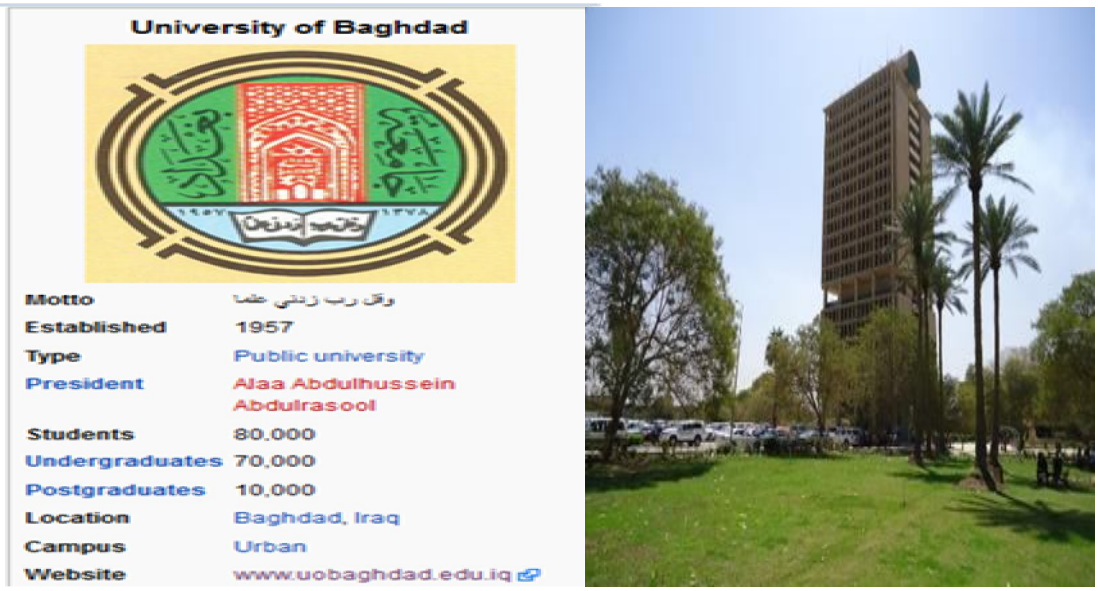


Figure 24 Picture and Details of Baghdad University

4.2.System Design

4.2.1. Data Collection

The required information on the area of research (the University of Baghdad) was collected from the three sources below:

1. **Advisory Office of Engineers of Baghdad University**

An official document provided by Baghdad University was prepared in order to facilitate the task of the provision of data and maps required for the completion of the scientific research.

Visits to the university and the help of workers in an engineering consulting firm enabled the researcher to obtain data and maps that were available. Not all the maps and data were up to date and many data and tracts were not projected on the master plan of the university, which was one of the difficulties faced by the researcher, as shown in Figure 25.

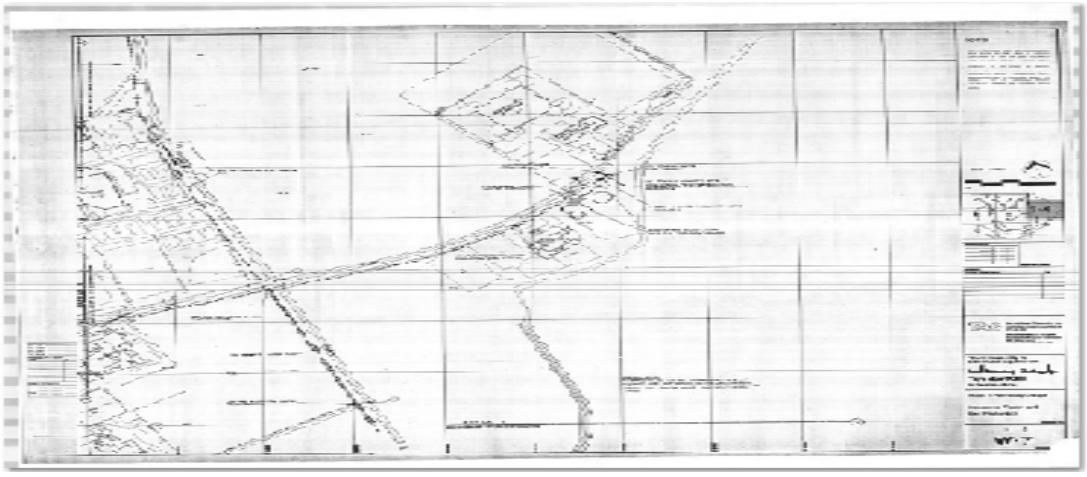


Figure 25 Paper Maps of Baghdad University

2. Google Earth

To determine the geographical location of the university buildings correctly and to install all the geographical boundaries of each of the university facilities, the researcher integrated a basic map of the university with a satellite image and merged all the coordinates of the sites through the program Google Earth, as shown in Figure 26.

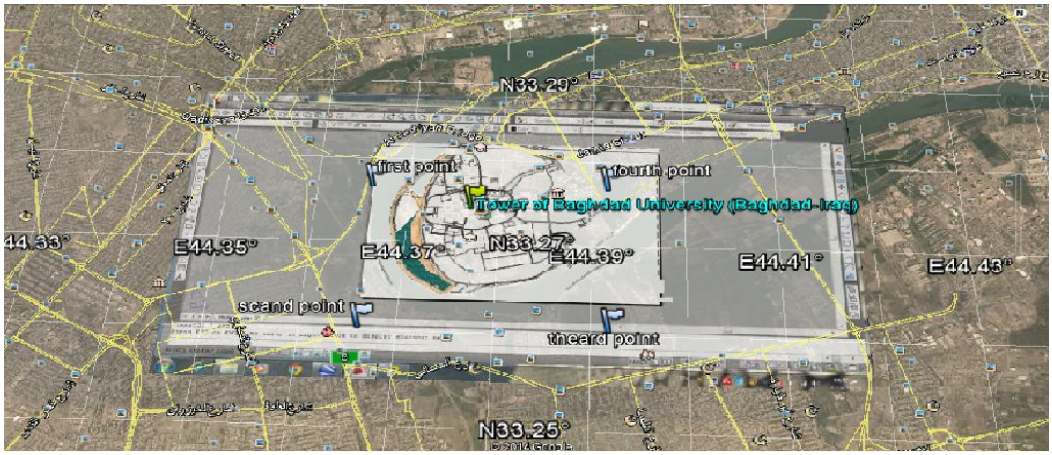


Figure 26 Baghdad University Map in Google Earth

3. Site visits and Paper Documents

There were a lot of private and specific data such as; A. power transmission lines, B. sewer pipe, C. transmission lines, D. deep and distances potable water, and E. buried lines, for which the researcher adopted sources from within and outside the university through site visits, as seen in Figure 27.

Figure27 Getting Information in the Field

4.2.2. Organization of the Data in the AutoCAD Environment

Many of the maps were not updated and were paper maps, all of which must be converted in the AutoCAD environment because of its ease of use and ability to deal well with GIS programs (ArcGIS, MapInfo), as shown in Figure 28.

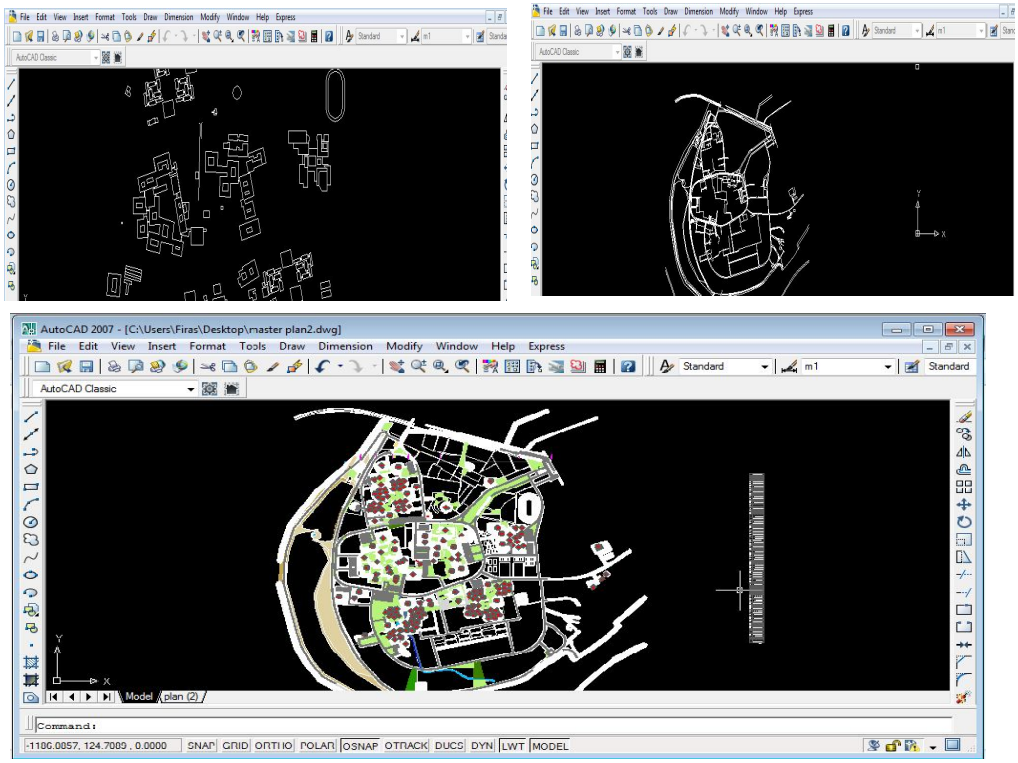


Figure 28 AutoCAD Maps (Baghdad University)

4.2.3. Creating Layers (shape files)

As shown in Figure 29, to build an integrated GIS it is important for the case study university to create and convert all mapping services (roads, buildings, power grid and water network, communications, sanitation, street lighting, etc.).

Conversion of maps in CAD format to ArcGIS format was necessary. Files in DWG, DXF, and DGN formats were transferred to the ArcGIS environment.

.

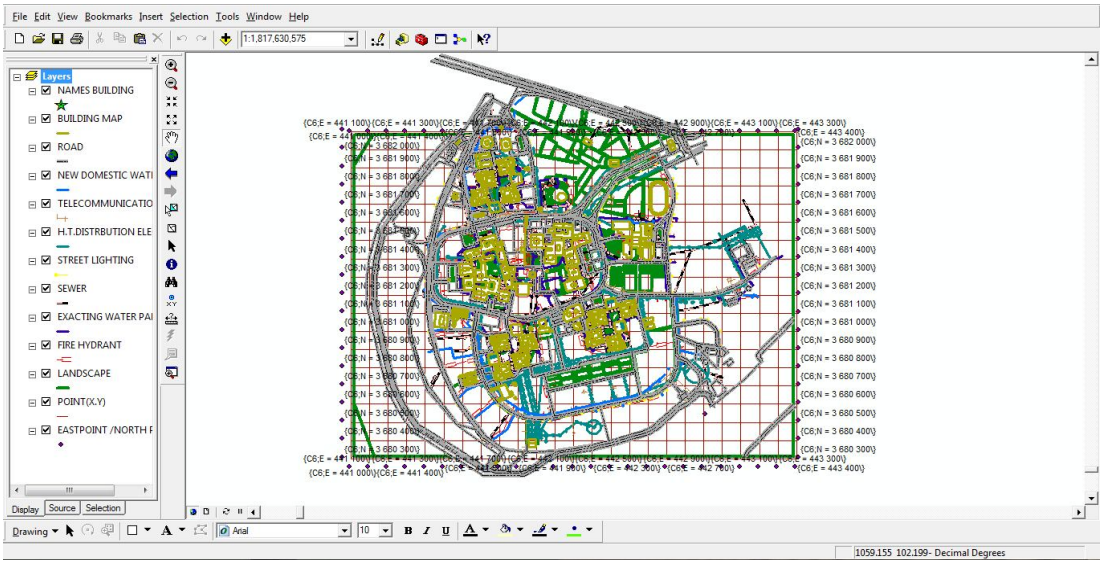
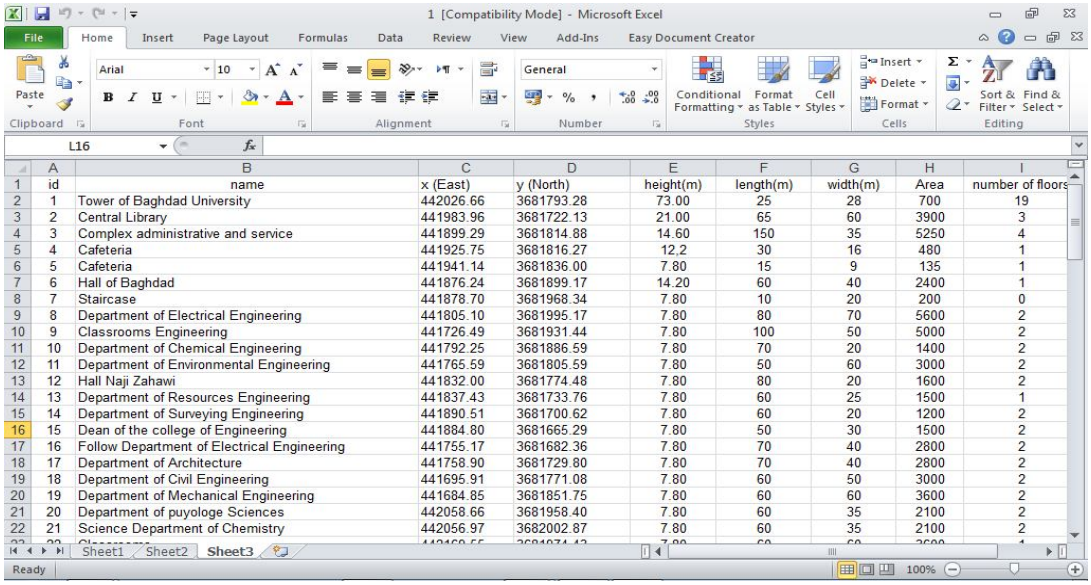


Figure 29 Creation of Ship File

4.2.4. Building the Databases

Figure 30 is shown the information system's infrastructure relating to transactions occurring on campus. After this stage, the verbal campus information system attributes of the infrastructures.

A table is created automatically for all layers, consisting of table records (rows) and fields (columns). Each graph in the layer has a row in the table in order to handle the attributes of each object. For all the information and values of the various attributes of each object, there is a column as seen in Figure 31. Each building in the campus information system should be presented as part of the attribute information as shown in Figure 32.



1 [Compatibility Mode] - Microsoft Excel

id	name	x (East)	y (North)	height(m)	length(m)	width(m)	Area	number of floors
1	Tower of Baghdad University	442026.66	3681793.28	73.00	25	28	700	19
2	Central Library	441983.96	3681722.13	21.00	65	60	3900	3
3	Complex administrative and service	441899.29	3681814.88	14.60	150	35	5250	4
4	Cafeteria	441925.75	3681816.27	12,2	30	16	480	1
5	Cafeteria	441941.14	3681836.00	7.80	15	9	135	1
6	Hall of Baghdad	441876.24	3681899.17	14.20	60	40	2400	1
7	Staircase	441878.70	3681968.34	7.80	10	20	200	0
8	Department of Electrical Engineering	441805.10	3681995.17	7.80	80	70	5600	2
9	Classrooms Engineering	441726.49	3681931.44	7.80	100	50	5000	2
10	Department of Chemical Engineering	441792.25	3681886.59	7.80	70	20	1400	2
11	Department of Environmental Engineering	441765.59	3681805.59	7.80	50	60	3000	2
12	Hall Naji Zahawi	441832.00	3681774.48	7.80	80	20	1600	2
13	Department of Resources Engineering	441837.43	3681733.76	7.80	60	25	1500	1
14	Department of Surveying Engineering	441890.51	3681700.62	7.80	60	20	1200	2
15	Dean of the college of Engineering	441884.80	3681665.29	7.80	50	30	1500	2
16	Follow Department of Electrical Engineering	441755.17	3681682.36	7.80	70	40	2800	2
17	Department of Architecture	441758.90	3681729.80	7.80	70	40	2800	2
18	Department of Civil Engineering	441695.91	3681771.08	7.80	60	50	3000	2
19	Department of Mechanical Engineering	441684.85	3681851.75	7.80	60	60	3600	2
20	Department of puyologe Sciences	442058.66	3681958.40	7.80	60	35	2100	2
21	Science Department of Chemistry	442056.97	3682002.87	7.80	60	35	2100	2

Figure 30 Attributes of the Campus Information System

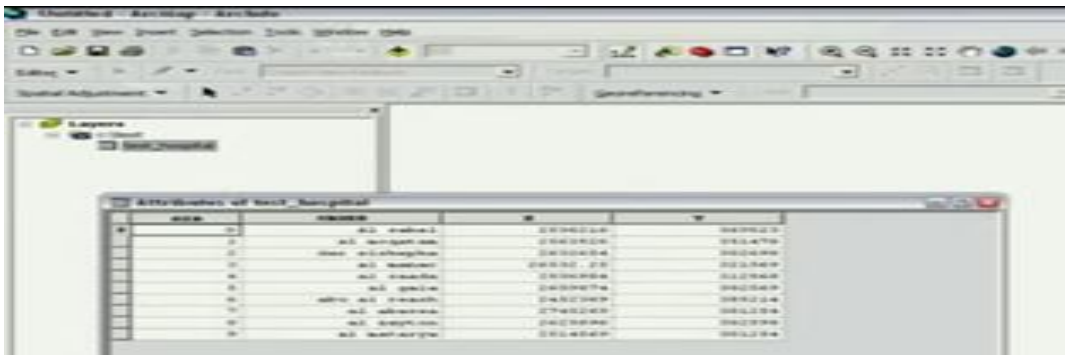


Figure 31 Excel File Opened in ArcGIS

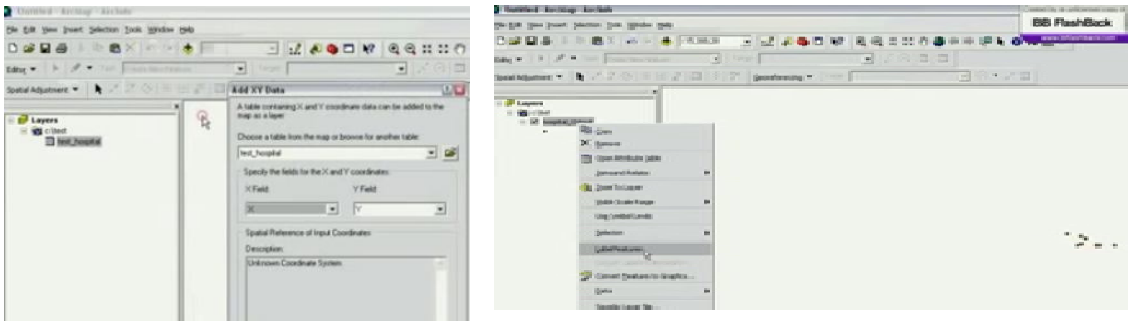


Figure 32 Conversion of Excel File to Coordinate System Shapefile

4.2.5. Coordinate System

"Within ArcGIS, every data set has a coordinate system, which is used to integrate it with other geographic data layers within a common coordinate framework such as a map", as seen in Figure 33.

"Coordinate systems enable to integrate data sets within maps as well as to perform various integrated analytical operations such as overlaying data layers from disparate sources and coordinate systems." [50]

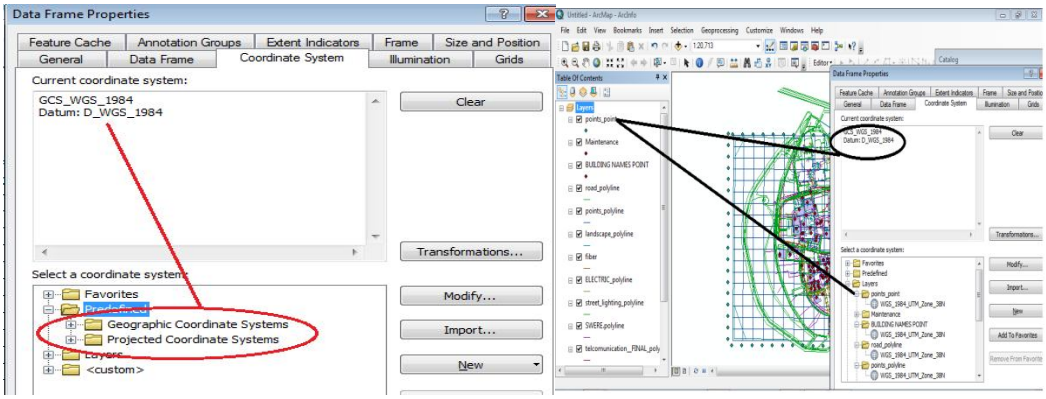


Figure 33 Converted Coordinate System

4.3. Configuring the New Layers

Before integrating the layers for the university campus information system, layers for maintenance and the fibre optic cable network were designed to include new layers can be seen in Figure 34.

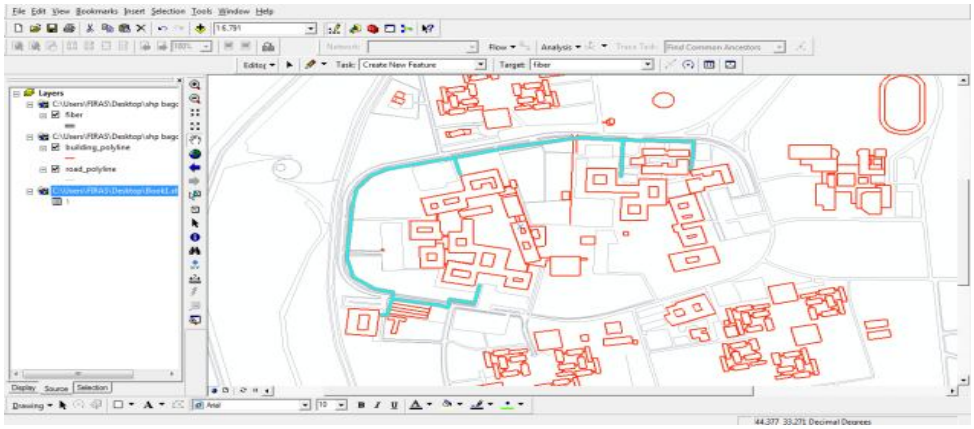


Figure 34 Configuration of New Layers (maintenance and fibre optic cable)

4.4. Preparing the Interface for Applications

After converting all the maps and data and integrating them with some shape files from the University of Baghdad, which are easy for staff and technicians to handle, all files can be opened in the MapInfo software program as shown in Figure 35. The plan in Figure 36 shows the mode of action through a range of options that illustrate the impact of each of them on the premises of Baghdad University.

To design interfaces, work can be carried out through the program MapBasic. This type of program provides a good platform for interaction with the design of GISs and interfaces implementation of University of Baghdad is shown in Figure 37. The special program design code can be seen in the Appendix (A1. MapBasic Code).

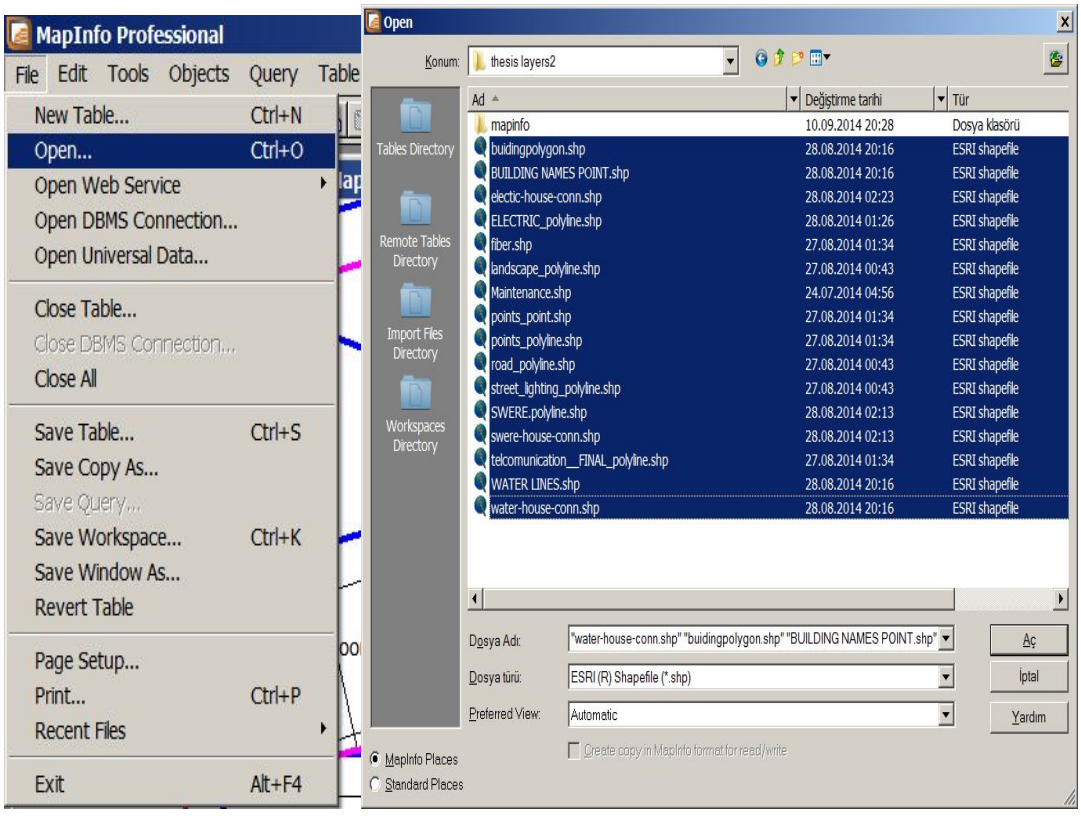


Figure 35 Interface for Data Conversion

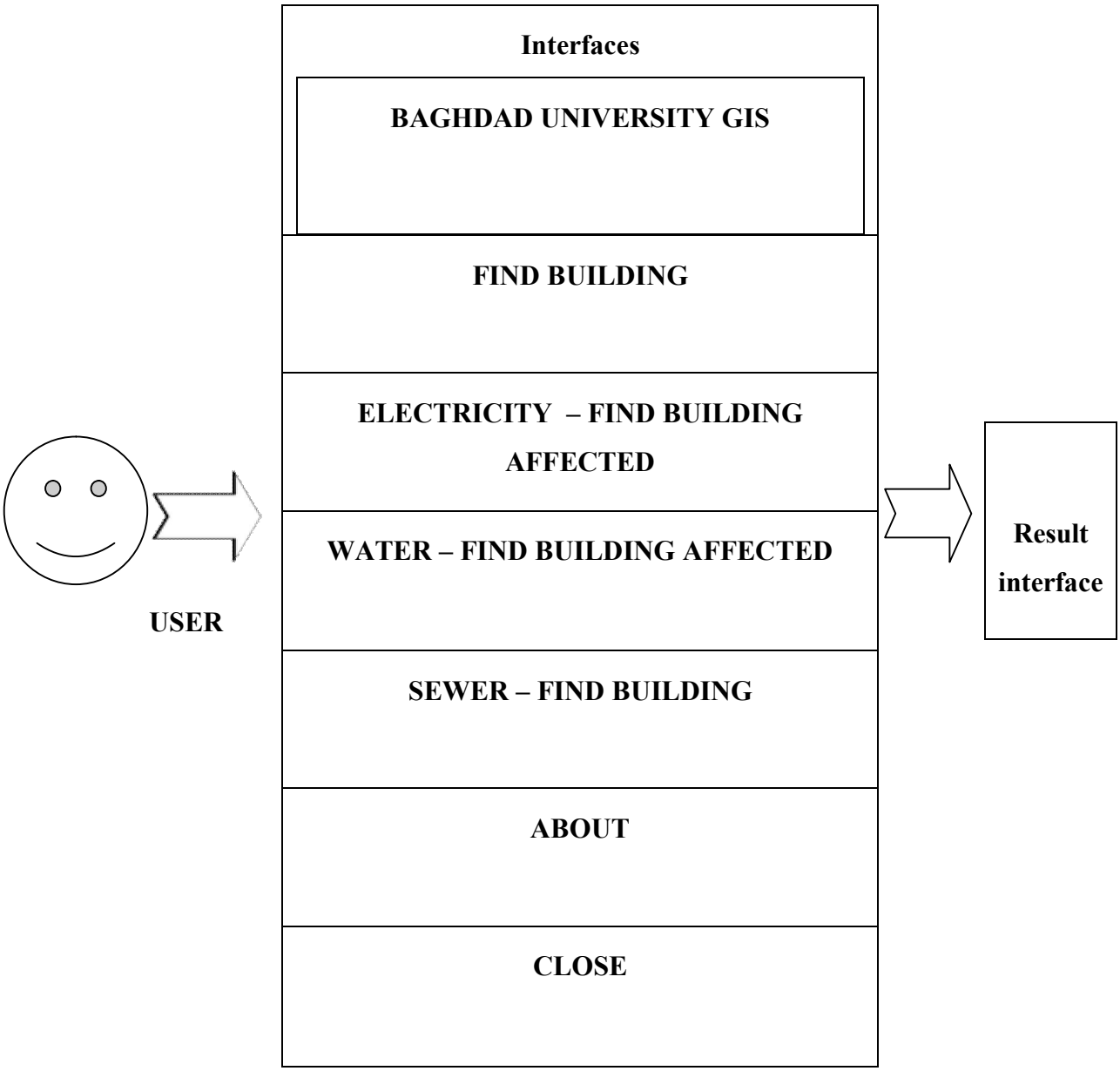


Figure 36 Planner Illustrating the Application İnterfaces

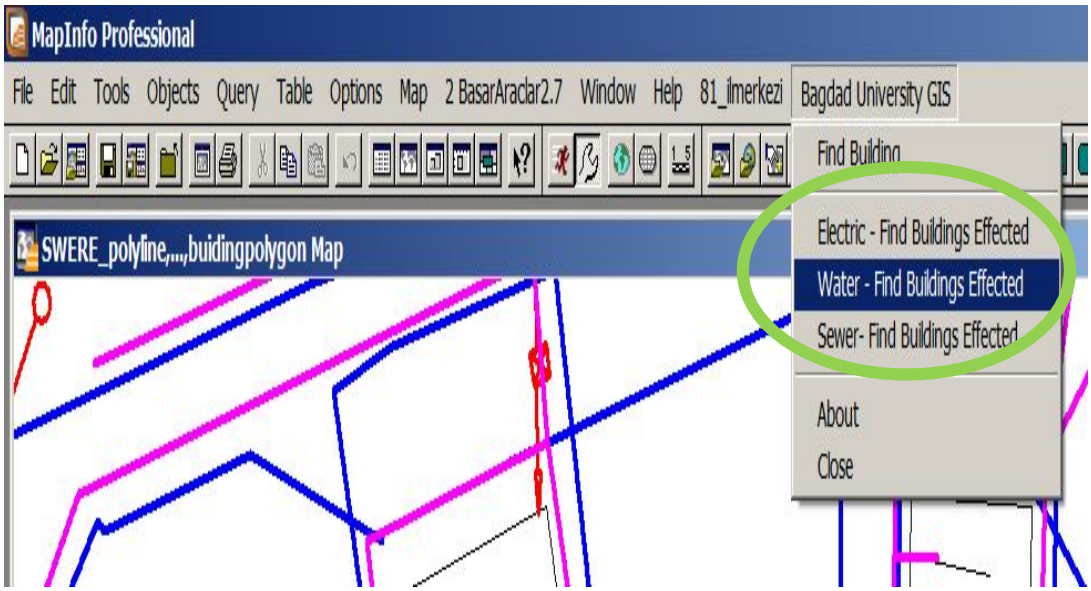


Figure 37 A Snapshot of the Application

4.5. Running the Applications

The designed interfaces for the applications can be used by the administrative, technical, and service departments of the University of Baghdad at the same time according to the requirements in order to update and modify the data and retrieve information.

While implementing the applications, interfaces help the users of the university campus information system through interaction with spatial linking events. Interfaces for applications consist of the following.

4.5.1. Finding the Buildings Query

In this application, buildings are listed in the list box, the names are in the dialogue box, and the building selected can be found easily on the map as shown in Figure 38. When choosing any building we can see that the colour of the building on the map is different from that of other buildings.

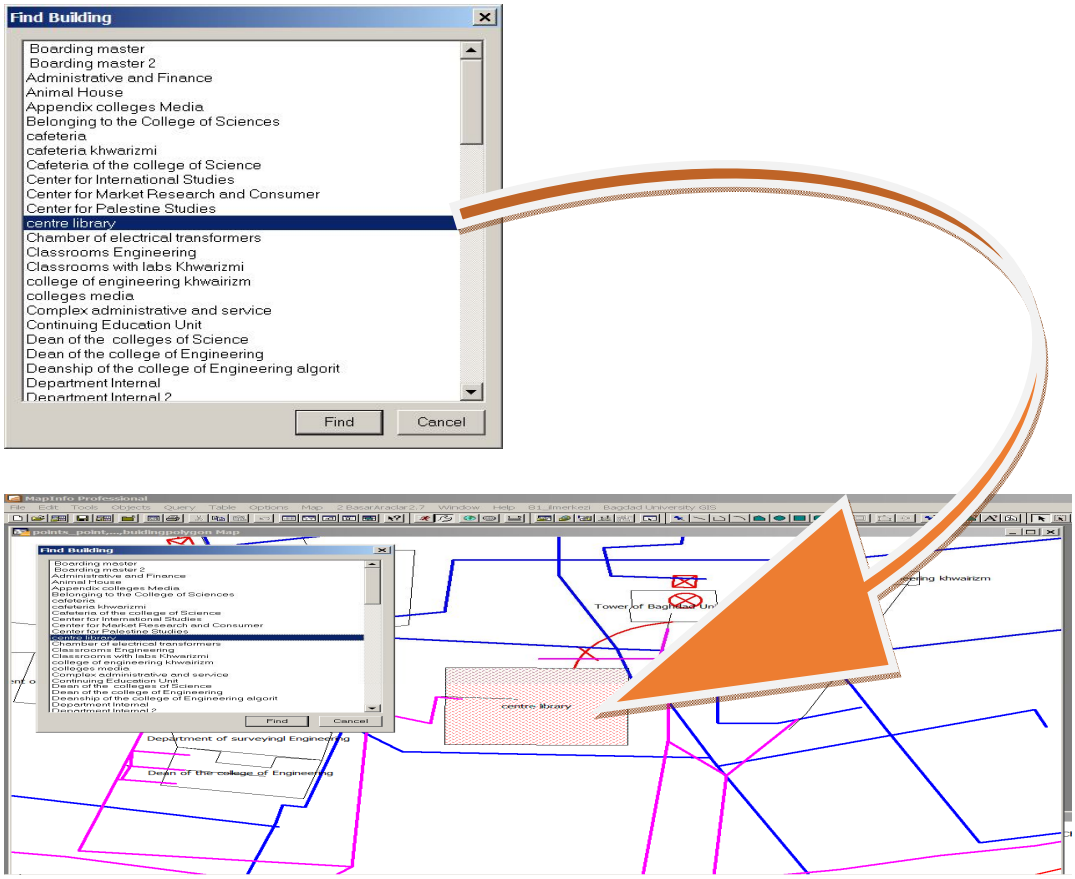


Figure 38 Display for the Building-Finding Application

4.5.2. Electricity – Finding the Affected Building

In this application, we can choose the cable connection and see the links to buildings lacking electricity, as shown in Figure 39. This interface provides the possibility of determining the number of buildings at the University of Baghdad that will be affected by an electricity cut. We can distinguish the affected buildings from the others by using a different colour.

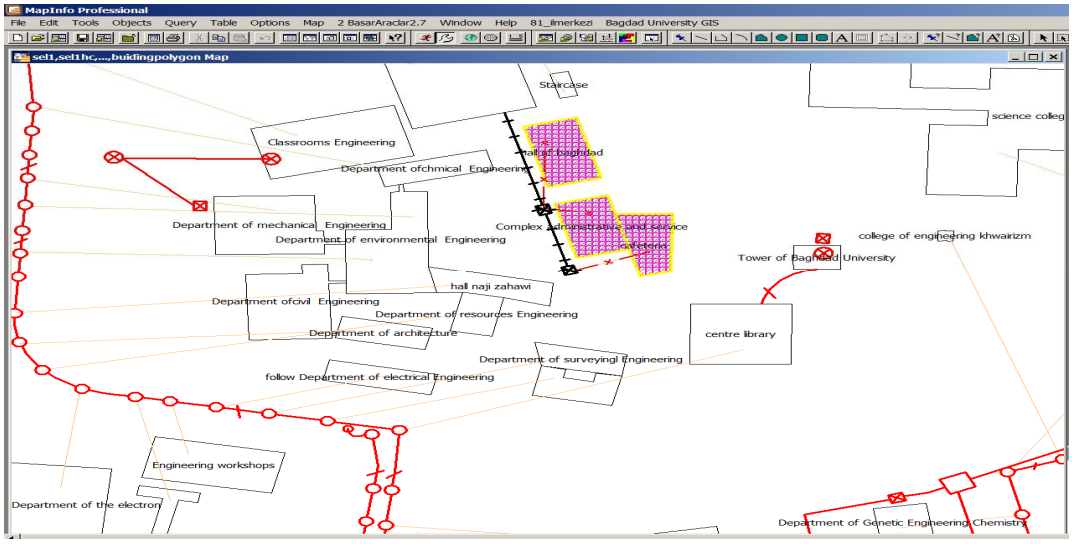


Figure 39 Finding the Buildings Affected by Electricity Shortage

4.5.3. Water – Finding the Affected Building

In this application, we can determine the water pipes and connections and see the buildings affected by water shortages as shown in Figure 40.

This interface provides the possibility of extracting areas affected by water and considering the buildings that will be affected. This application helps to provide support for buildings, especially in the maintenance department of the University of Baghdad.

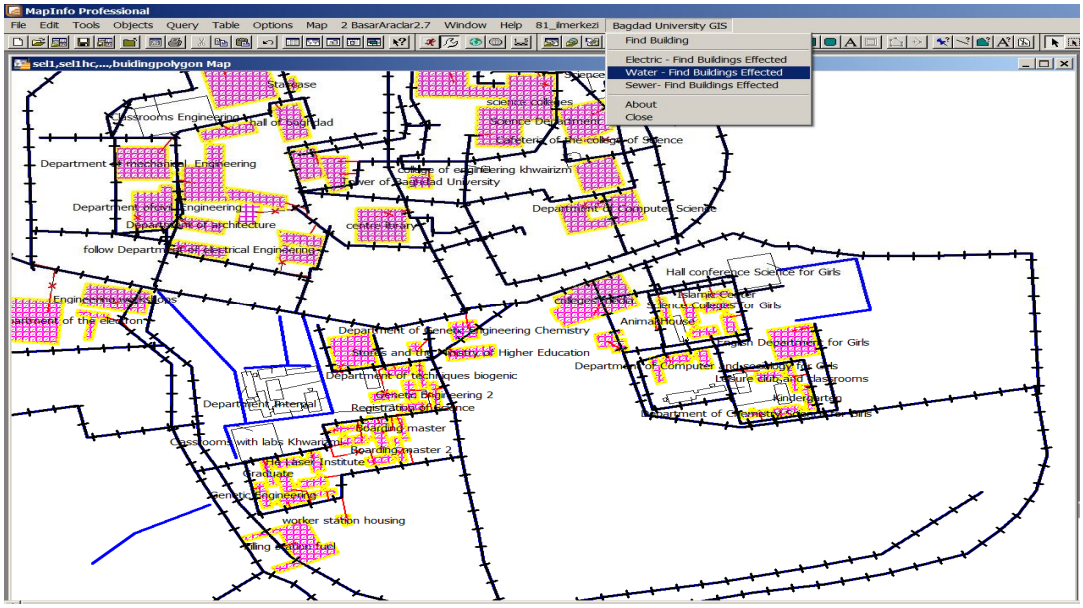


Figure 40 Finding Buildings Affected by Water Shortage

4.5.4. Sewer – Finding Affected Buildings

In this application, we can determine sewer pipes and see the connections implemented for buildings with any problems within the University of Baghdad. As seen in Figure 4.18, this interface service section supports the maintenance of the integrating by identifying and blocking areas of the damage to the sewer lines and showing where the buildings will be affected. Here the affected buildings are highlighted in different colours.

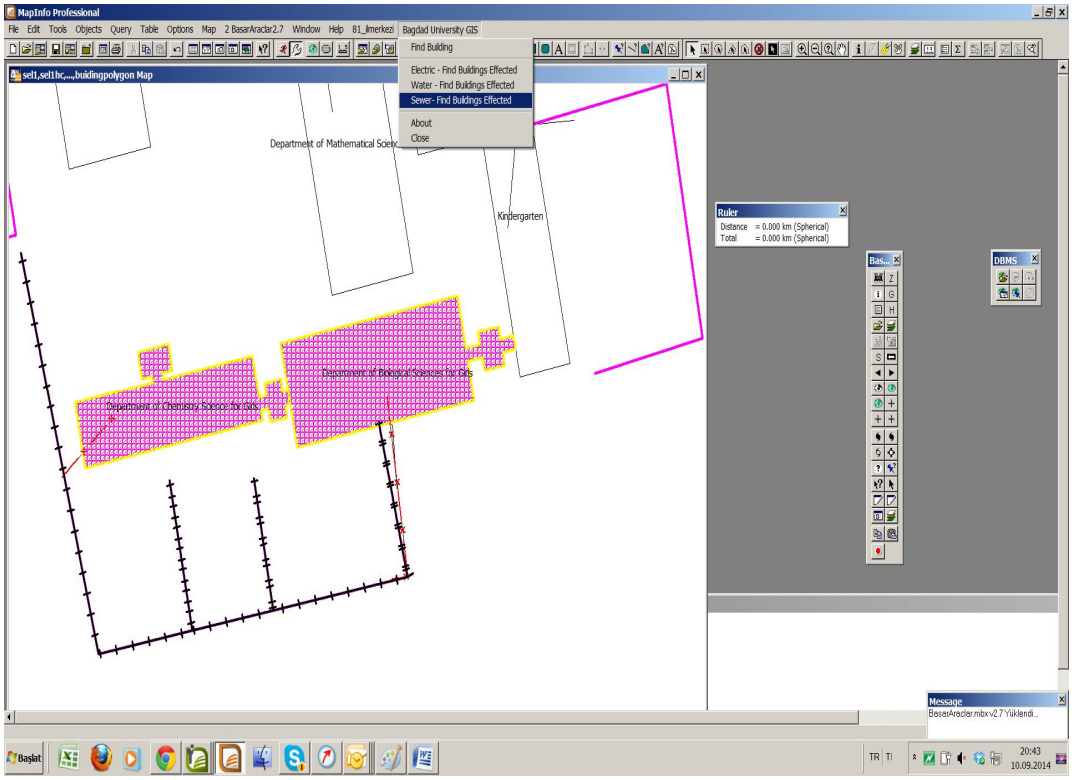


Figure 41 Finding Buildings Affected by Sewer Problems

CHAPTER 5

CONCLUSION

5.1. Conclusion

We live in an Age of Attention in this century of technology in all areas of life and we must step forward to find ways to take advantage of the convenience brought for all aspects of society.

The university environment plays an important role in the development of the education sector, and to make project faster and give this sector momentum we need to integrate technologies and information systems that are now inseparable from this sector.

Information systems create efficiency, which should be enjoyed as it makes higher education at universities more effective. With information systems established at universities, the speed of access to information and knowledge will increase efficiency. Information systems can be achieved by using the location-, university in a different fields.

A great many users can find this information efficiently on a common platform and view the same data simultaneously. It should be clear that an information system has advantages in terms of time and cost. This system is an inexpensive and cost-effective approach because users can easily find the data they seek. The campus information system of Baghdad University will be easy for both trained and untrained users to use, and it is capable of responding to all the needs of users and carrying out analyses.

The future of campus GIS will have a higher degree of information integration, and it will be necessary to use additional software with the Baghdad University campus information system in order to improve and expand this system to meet future

demands, for user interface developments depending on user needs, and to enable users to retrieve the necessary information.

5.2. Future Work

It is useful to use an information system on campus in order to achieve greater efficiency in completing my project. The entire campus of Baghdad University should be involved in the project of such an information system on campus, but also for other of projects, and the work done should involve proper division of labor as more participation is necessary for the system data. In this way, the quantity and quality of data will increase. Thus, the quality of the information system on campus will also increase as the importance of information management systems demands on campus. It is important to emphasize that for the development of the system it is necessary to increase participation. Administrative arrangements are necessary for the establishment of an integrated information system on campus.

The importance of project can come through the physical and scientific support of the university and we must have a specialist unit within the campus that should be responsible for the collection of data, variables, and developments happening within the university.

By examining the experiences of the developers as well as acquiring by using expertise of the world, who are able to help in training and increasing the efficiency of workers in the information system, the Baghdad campus information system can be enhanced.

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